

Claims

We claim:

1. A method for supplying a useable heat flow, and recycling waste heat, to an incorporated heat engine of a thermal power plant, comprising the steps of:
 - a. generating a super-ambient temperature region thus providing a heat source for said incorporated heat engine by condensing a sub-ambient temperature, sub-ambient pressure, working fluid vapor flow into an ambient temperature, super-ambient pressure, working fluid liquid flow thereby producing a super-ambient temperature, super-ambient pressure, working fluid liquid flow, which is then routed through a means to transfer said useable heat flow to said incorporated heat engine,
 - b. generating a sub-ambient temperature region thus providing a heat sink for said incorporated heat engine by exposing an ambient temperature, ambient pressure, working fluid liquid flow to sub-ambient pressure and a portion of said useable heat flow that is rejected, i.e., wasted by said incorporated heat engine thereby evaporating a portion of said ambient temperature, ambient pressure, working fluid liquid flow thus producing a portion of said sub-ambient temperature, sub-ambient pressure, working fluid vapor flow that is required in step a, and
 - c. extracting heat from an external heat source in sufficient quantity to replenish that portion of said useable heat flow, which is converted to work or otherwise lost from said thermal power plant, e.g., thermal

leakage, and to supply the latent heat of vaporization for the remaining portion of said sub-ambient temperature, sub-ambient pressure, working fluid vapor flow that is required in step a, whereby a portion of said useable heat flow is replenished from an external heat source as said incorporated heat engine converts most of a like portion of said useable heat flow into mechanical power.

2. The method of claim 1 wherein a portion of said useable heat flow that is rejected to said heat sink is collected and returned to said heat source for subsequent use by said incorporated heat engine, whereby a portion of said useable heat flow that would be rejected from said thermal power plant is recycled for subsequent use by said incorporated heat engine.
3. The method of claim 1 wherein a portion of said useable heat flow that is otherwise lost from said thermal power plant, e.g., thermal leakage, is collected and returned to said heat source for subsequent use by said incorporated heat engine, whereby a portion of said useable heat flow that would be otherwise lost from said thermal power plant is recycled for subsequent use by said incorporated heat engine.
4. An apparatus for supplying a useable heat flow, and recycling waste heat, to said incorporated heat engine of a thermal power plant, consisting of:
 - a. a means of imparting flow and super-ambient pressure to a portion of an ambient temperature, ambient pressure, working fluid liquid flow,

- b. a means of converting the hydraulic power of said ambient temperature, super-ambient pressure, working fluid liquid flow into a region of sub-ambient pressure,
- c. a means of evaporating at a sub-ambient temperature a portion of said ambient temperature, ambient pressure, working fluid liquid flow by exposing said flow to said sub-ambient pressure region generated in step b and a source of heat to supply a portion of the required latent heat of vaporization,
- d. a means to combine said ambient temperature, super-ambient pressure, working fluid liquid flow with said vapor flow generated in the step c, in order to produce a super-ambient temperature, super-ambient pressure, working fluid liquid flow,
- e. a means to supply said useable heat flow from said heat source to said incorporated heat engine,
- f. a means, i.e., said incorporated heat engine, to convert a portion of said useable heat flow into mechanical power to drive a mechanical load,
- g. a means to reject to said heat sink that portion of said useable heat flow, which is not utilized, i.e., wasted by said incorporated heat engine,
- h. a means to supply a portion of the heat that is required in step c with a portion of said useable heat flow, which is rejected by said incorporated heat engine,
- i. a means to collect a portion of the heat otherwise lost from said thermal

power plant and utilize it to provide a portion of a replenishment heat flow, and

- j. a means to extract a portion of said replenishment heat flow from an external heat source, and use said replenishment heat flow to supply the remainder of the heat that is required in step c, whereby a portion of said replenishment heat flow is extracted from said external heat source, and is supplied to said incorporated heat engine, where a portion of said useable heat flow is converted into mechanical power.
- 5. The apparatus of claim 4 wherein said heat sink, which is self-generated by said thermal power plant, to collect the heat rejected by said incorporated heat engine, also enables said thermal power plant to generate a thermal potential between itself and said external heat source, thus enabling said thermal power plant to extract a portion of said replenishment heat flow from said external heat source.
 - 6. The apparatus of claim 4 wherein said replenishment heat flow may be extracted from any employable external heat source, e.g., geothermal pool, solar collector, industrial process cooling fluid, large body of liquid water, any useable concentration of heat, etc.
 - 7. The method of claim 1 and the apparatus of claim 4 wherein heat is extracted from an employable external heat source to replenish the heat that is converted to work or otherwise lost from the system, and collected system thermal losses and a portion of the heat that is rejected from the incorporated heat engine are recycled to said super-ambient temperature

region, whereby employable net mechanical power is produced by said thermal power plant, proportionate to said heat extracted from said external heat source.